CALCULUS I WORKSHEET: u-substitution

Find the following indefinite integrals:

A) \( \int (x^{\frac{1}{2}} + 2)^{\frac{1}{2}} x^{\frac{1}{2}} \, dx \)

\( f(u) = \) \( u'(x) = \)

Answer:

B) \( \int \frac{1}{\sin^2 x} \cos x \, dx \)

\( f(u) = \) \( u'(x) = \)

Answer:

C) \( \int \frac{x}{x^{\frac{1}{2}} + 1} \, dx \)

Hint: play around until you find \( f(u) \), \( u(x) \) that works (barring constant factor).

D) \( \int \sec^2 x \tan x \, dx \)

Hint: regroup as \( f(u) \) \( u'(x) \)

Try a definite one: (do indefinite first then use it.)

E) \( \int_{\frac{\pi}{3}}^{\pi/2} \sin x \sec^3 x \, dx \)

Try an \( 'x-' \) substitution instead of \( u-' \) substitution:

F) \( \int \sqrt{1-x^2} \, dx \)

Substitute \( x = \sin \theta \) 

Differentiate \( dx = \cos \theta \, d\theta \)

What is \( \int_{0}^{1} \sqrt{1-x^2} \, dx \)?